

WHAT IS CLAIMED IS:

1. A sectional upward acting door including interconnected door panels, said panels comprising generally planar rectangular members each having a generally planar
5 outer wall part and generally planar inner wall parts spaced from said outer wall part, an elongated upper edge of said panel including an upwardly projecting convex surface extending at an angle with respect to said outer wall part and including a curvilinear portion adjacent to and contiguous
10 with a generally planar wall portion extending substantially parallel to said outer wall part and an inclined wall part extending from said generally planar wall portion, an elongated lower edge of said panel including a tip portion contiguous with said outer wall part and a concave part of
15 said lower edge formed by plural planar segments inclined with respect to said outer wall part toward a further inclined wall part extending from said concave part, said upper and lower edges being cooperable with each other between adjacent interconnected panels to form a pinch resistant joint when
20 said adjacent panels are pivoted relative to each other, and hinges interconnecting adjacent ones of said panels.

2. The door set forth in Claim 1 wherein said hinges comprise:

plural hinge assemblies spaced apart along and interconnecting adjacent ones of said panels, said hinge
5 assemblies being connected to said inclined wall part of one panel adjacent its upper edge and said inclined wall part adjacent said lower edge of an adjacent panel, said hinge assemblies being disposed substantially between said outer wall part and said inner wall parts of said panels,
10 respectively, and forming a pivot connection between adjacent panels.

3. The door set forth in Claim 1 including:

an elongated groove formed in said lower edge of each of said panels and adapted to receive an elongated
15 resilient seal strip therein, said seal strip being engageable with said upper edge of an adjacent panel to form a seal between adjacent panels when said door is in a closed position.

4. The door set forth in Claim 1 including:

spaced apart inner wall parts integrally joined with said inclined wall parts of said upper and lower edges, respectively, said inner wall parts extending toward each
5 other but leaving a substantial gap therebetween; and

each of said panels includes a reinforcing backer adapted to be secured to said panel and extending between said inner wall parts to form a closed cavity within said panel between said outer wall part and said inner wall parts.

5. The door set forth in Claim 4 wherein:

said spaced apart inner wall parts are formed with respective grooves extending generally toward said outer wall part and adapted to receive opposed spaced apart flanges of said backer, respectively, for supporting said backer on said panel.

6. The door set forth in Claim 4 wherein:

each of said panels are filled with an insulating material between said outer wall part and said inner wall parts and between said outer wall part and said backer.

7. The door set forth in Claim 1 wherein:

said upper and lower edges of adjacent panels cooperate with each other to form a variable width gap therebetween extending along said concave planar segment of said lower edge and said convex surface of said upper edge, said gap not increasing as said panels rotate with respect to each other to a point which would permit insertion of a person's finger between said upper and lower edges of adjacent panels.

8. The door set forth in Claim 7 wherein:

said variable width gap is provided by said planar segments of said lower edge extending at angles with respect to each other and said outer wall part of said panel, and said upper edge of an adjacent panel is formed by plural contiguous segments which are inclined to each other and to said outer wall part of said panel and by a curvilinear segment adjacent one of said inclined segments and an apex of said upper edge.

9. The door set forth in Claim 1 wherein:

said panels are each formed by a first panel part defining said concave part of said lower edge and said convex surface of said upper edge, a second panel part joined to said first panel part and defining one of said inclined wall parts and an inner wall part, and a third panel part defining the other of said inclined wall parts and another inner wall part, said panel parts being joined together at cooperating flanges, and elongated elastomeric gasket members interposed said flanges and said outer and inner panel parts.

10. The door set forth in Claim 9 wherein:

said gaskets extending between said panel parts are engageable with each other between adjacent panels to form a seal between said panels in a closed position of said door.

11. The door set forth in Claim 2 wherein:

said hinge assemblies each include opposed hinge plates, a hinge pin on one of said hinge plates, at least one bearing bore on the other of said hinge plates for receiving said hinge pin and an elastically deflectable retainer on said other hinge plate for retaining said hinge pin in said bearing bore in response to insertion of said hinge pin into said bearing bore.

12. The door set forth in Claim 11 wherein:

said other hinge plate includes a web part, spaced apart flanges secured to said web part and extending generally parallel to each other, a bearing bore formed in each of said flanges and guide surfaces formed on each of said flanges for guiding opposed distal ends of said hinge pin into said bearing bores, respectively.

13. The door set forth in Claim 12 wherein:

said retainer comprises an elastically deflectable tab formed on each of said flanges for retaining opposite ends of said hinge pin in said bearing bores, respectively.

14. The door set forth in Claim 11 wherein:

said retainer includes opposed elastically deflectable fingers defining a gap therebetween for receiving said hinge pin for deflecting said fingers to allow forcible
5 insertion of said hinge pin into said bearing bore, said fingers being elastically restorable to a position to retain said hinge pin in said bearing bore.

15. The door set forth in Claim 14 wherein:

said one hinge plate includes opposed parts engageable with said other hinge plate to prevent longitudinal displacement of said hinge plates relative to each other
5 sufficient to disengage said hinge plates from each other in predetermined positions of said hinge plates with respect to each other.

16. The door set forth in Claim 14 wherein:

said hinge pin is integrally formed on said one hinge plate.

17. The door set forth in Claim 16 wherein:

said hinge pin is formed by opposed pin portions which are rolled in opposite directions to form a substantially cylindrical hinge pin integral with said one
5 hinge plate.

18. The door set forth in Claim 1 including:

opposed structural members on at least selected ones of said panels, said structural members including guide member support bracket retaining parts formed thereon, and opposed
5 guide member support brackets operable to be slidably engaged with said structural members and retained thereon for supporting opposed guide members for said panels, respectively.

19. The door set forth in Claim 18 wherein:

said retaining parts are formed on said structural members by displacing material from a surface of said structural members, respectively, to form said retaining
5 parts, respectively.

20. The door set forth in Claim 19 wherein:

said guide member support brackets each include a web portion and spaced apart bosses formed thereon for engagement with said structural members at locations adjacent
5 said retaining parts, respectively, to provide for assembly of said guide member support brackets to said panels, respectively.

21. A sectional upward acting door comprising interconnected door panels, each of said panels comprising generally planar rectangular members, each having a generally planar outer wall part and generally planar inner wall parts spaced from said outer wall part, an elongated upper edge of said panel including an upwardly projecting convex surface extending inwardly with respect to said outer wall part toward said inner wall part and including a curvilinear portion having a first radius of curvature adjacent to and contiguous with an apex of said upper edge, said apex being curvilinear and having a second radius of curvature less than said first radius of curvature, said apex being contiguous with a generally planar wall portion extending substantially parallel to said outer wall part, an elongated lower edge of said panel including a downwardly projecting curvilinear tip portion contiguous with said outer wall part and a concave part of said lower edge formed by plural planar segments inclined with respect to said outer wall part at successively increasing acute angles of inclination with respect to said outer wall part, said upper and lower edges being cooperable with each other between adjacent interconnected panels to form a pinch resistant joint when said adjacent panels are pivoted relative to each other.

22. The door set forth in Claim 21 wherein:

said upper edge of said panel includes an inclined wall part extending between said generally planar and parallel wall portion and an inner wall part joined thereto and said lower edge includes an inclined wall part extending between said concave part of said lower edge and said inner wall part of said panel, said inclined wall parts forming a recess between adjacent panels for receiving plural hinge assemblies wherein said hinge assemblies are disposed substantially between said outer wall part and said inner wall parts of said panels, respectively.

23. The door set forth in Claim 22 wherein:

said inner wall parts are integrally joined with said inclined wall parts of said upper and lower edges, respectively, and said inner wall parts are substantially coplanar and extend toward each other but leave a substantial gap therebetween.

24. The door set forth in Claim 23 wherein:

said inner wall parts each include a groove formed therein and extending substantially normal to the plane of said inner wall parts, respectively, and each of said panels includes a reinforcing backer secured to said panel and extending between said inner wall parts to form a closed cavity within said panel between said outer wall part and said inner wall parts, said reinforcing backer including spaced apart flange portions adapted to be inserted in said grooves in said inner wall parts, respectively.

25. A sectional upward acting door including inter-connectable door panels, said panels comprising generally planar rectangular members having respective upper and lower edges, said panels being adapted to be interconnected to each other by plural hinge assemblies spaced apart along and interconnecting adjacent ones of said panels and forming a pivot connection between adjacent panels, respectively, said hinge assemblies including opposed hinge plates adapted to be interconnected to each other by moving one panel adjacent to another panel.

26. The door set forth in Claim 25 wherein:
at least selected ones of said panels including guide member support brackets mounted on structural members of said panels and being adapted to be connected to said selected ones of said panels, respectively, by moving said brackets into engagement with said selected panels.

27. The door set forth in Claim 26 wherein:
each of said panels includes opposed structural stile members extending along opposed edges of said panels, said stile members including tab members formed thereon for engagement with a part of respective ones of said guide member support brackets whereby said guide member support brackets may be connected to a panel by sliding said support brackets into engagement with said stile members, respectively.

28. The door set forth in Claim 27 wherein:
said guide member support brackets include respective bosses formed thereon engageable with said stile members at said tab members for retaining said support brackets connected to said panel, respectively.

29. The door set forth in Claim 25 wherein:

said hinge assemblies include, respectively, a hinge pin on one of said hinge plates, at least one bearing bore on the other of said hinge plates for receiving said hinge pin and an elastically deflectable retainer on said other hinge plate for retaining said hinge pin in said bearing bore in response to insertion of said hinge pin into said bearing bore.

30. The door set forth in Claim 29 wherein:

said other hinge plate includes a web part, spaced apart flanges secured to said web part and extending generally parallel to each other, a bearing bore formed in each of said flanges and guide surfaces formed on each of said flanges for guiding distal ends of said hinge pin into said bearing bores.

31. The door set forth in Claim 29 wherein:

said retainer on other hinge plate includes opposed elastically deflectable fingers defining a gap therebetween for receiving said hinge pin for deflecting said fingers to allow forcible insertion of said hinge pin into said bearing bore, said fingers being elastically restorable to a position to retain said hinge pin in said bearing bore.

32. A door panel for a sectional upward acting door comprising:

5 a generally planar outer wall part, an elongated upper edge contiguous with said outer wall part including an upwardly projecting, convex surface extending at an angle with respect to said outer wall part and an inclined wall part extending inwardly away from said outer wall part and contiguous with said upper edge, a lower edge of said panel including a tip portion contiguous with said outer wall part,
10 a concave part of said lower edge and an inclined wall part extending from said lower edge and away from said outer wall part, said inclined wall parts having respective distal edges, at least one reinforcing stile extending between said inclined wall parts and including opposed portions of said stile which
15 lie adjacent said inclined wall parts and are adapted to receive fasteners for reinforcing said inclined wall parts in supportive relationship to respective hinge members connected to said panel at said upper and lower edges, respectively.

33. The door panel set forth in Claim 32 wherein:

said panel includes opposed end stiles having said opposed portions formed thereon, respectively.

34. The door panel set forth in Claim 33 including:

at least one intermediate stile having said opposed portions formed thereon for reinforcing said panel.

35. A method for assembling a sectional upward acting door wherein said door is operable to be supported for movement between open and closed positions between a pair of opposed spaced apart guide tracks, said door including plural, 5 generally planar panel members adapted to be connected to each other along opposed edges of adjacent panel members and said door including plural hinge assemblies including, respectively, opposed hinge plates adapted to be connected to upper and lower edges of adjacent panels, respectively, and 10 plural guide member support brackets also adapted to be connected to said panels, respectively, said method comprising the steps of:

placing a first panel between said guide tracks and connecting said first panel to said guide tracks;

15 placing a second panel between said guide tracks and adjacent to said first panel wherein an edge of said first panel is adjacent an edge of said second panel;

moving said panels toward each other to connect said panels by engaging said hinge plates of said hinge assemblies 20 with each other, respectively; and

mounting at least two support brackets on said second panel with opposed guide members connected to said support brackets to support said second panel between said guide tracks.

36. The method set forth in Claim 35 wherein:

the step of moving said panels toward each other comprises lowering said second panel into engagement with said first panel by interengaging said hinge plates of respective
5 ones of said hinge assemblies with each other by moving said first and second panels relative to each other in a direction generally parallel to the longitudinal extent of said guide tracks.

37. The method set forth in Claim 36 wherein:

the step of connecting said support brackets to said second panel comprises sliding said support brackets into engagement with said second panel at spaced apart bracket
5 receiving tabs formed on structural members of said second panel, respectively.

38. A hinge assembly useful for interconnecting panels of a multipanel door, said hinge assembly comprising:

opposed hinge plates, a hinge pin on one of said hinge plates, at least one bearing bore on the other of said
5 hinge plates for receiving said hinge pin and an elastically deflectable retainer on said other hinge plate for retaining said hinge pin in said bearing bore in response to insertion of said hinge pin into said bearing bore.

39. The hinge assembly set forth in Claim 38 wherein:

said other hinge plate includes a web part, spaced apart flanges secured to said web part and extending generally parallel to each other, a bearing bore formed in each of said
5 flanges and guide surfaces formed on each of said flanges for guiding opposed distal ends of said hinge pin into said bearing bores, respectively.

40. The hinge assembly set forth in Claim 39 wherein:
said retainer comprises an elastically deflectable
tab formed on each of said flanges for retaining opposite ends
of said hinge pin in said bearing bores, respectively.

41. The hinge assembly set forth in Claim 39 wherein:
said other hinge plate includes opposed elastically
deflectable fingers defining a gap therebetween for receiving
said hinge pin for deflecting said fingers to allow forcible
5 insertion of said hinge pin into said bearing bore, said
fingers being elastically restorable to a position to retain
said hinge pin in said bearing bore.

42. The hinge assembly set forth in Claim 41 wherein:
said one hinge plate includes opposed parts
engageable with said other hinge plate to prevent longitudinal
displacement of said hinge plates relative to each other
5 sufficient to disengage said hinge plates from each other in
predetermined positions of said hinge plates with respect to
each other.

43. The hinge assembly set forth in Claim 41 wherein:
said hinge pin is integrally formed on said one
hinge plate.

44. The hinge assembly set forth in Claim 43 wherein:

said hinge pin is formed by opposed pin portions which are rolled in opposite directions to form a substantially cylindrical hinge pin integral with said one
5 hinge plate.